

January 10, 1984

CD 84-2-MC

Dear Motorcycle Manufacturer:

Kawasaki Motors Corporation recently asked for an interpretation of the expression "bore spacing" as it applies to the classification of engine families in accordance with the provisions of 40 CFR 86.420-78(b).

Since this interpretation is likely to be of general interest, copies of the Kawasaki inquiry and the EPA response are provided to all motorcycle manufacturers as an enclosure to this letter.

If you have any questions regarding this correspondence, please contact Mr. J. Bozek at (313) 668-4244.

Sincerely yours,

Robert E. Maxwell, Director  
Certification Division  
Office of Mobile Sources

Enclosure

Mr. Jeffrey Shetler  
Governmental Relations Coordinator  
Kawasaki Motor Corporation  
2009 East Edinger  
Santa Ana, CA 92705

Dear Mr. Shetler:

This is in response to your November 30, 1983 letter in which you asked if the expression "bore spacing" in 40 CFR 86.420-78(b) is synonymous with the expression "cylinder bore center-

to-center dimension" in 40 CFR 86.084-24.

The two expressions are not precisely synonymous. When the bore centerline criterion was originally promulgated for applicability to 1972 model year light-duty vehicles, attention was focused on water-cooled engines with adjacent cylinders sharing a common block. The distribution of the incoming fuel/air mixture between the cylinders via a common manifold was presumed to have an effect on exhaust emissions. Therefore, the centerline distance between the cylinders was specified as one parameter which distinguishes separate engine families.

When the bore spacing criterion was originally promulgated for applicability to 1978 model year motorcycles, attention was focused on air-cooled engines with separate cylinders sharing a common crankcase. The rejection of heat by the individual cylinders were presumed to have an effect on exhaust emissions. Therefore, bore spacing was specified as one parameter which distinguishes separate engine families.

In regard to current motorcycle engines, both bore spacing and bore centerline dimensions can be significant from an emissions standpoint. For example, a four-cylinder engine can consist of two separate cylinder modules which are each comprised of two bores in a common block. Any change in the relative positions of the cylinder modules can be presumed to affect exhaust emissions and should therefore be considered as a basis for distinguishing separate engine families. Similarly, any change in the center line distance between the bores in either of the cylinder blocks can be presumed to effect exhaust emissions and should therefore be considered as a basis for distinguishing

separate engine families. However, changes in bore and/or stroke would not effect the bore spacing of the separate cylinder modules nor the centerline distances of the bores in either of the cylinder blocks and therefore would not be a basis for distinguishing separate engine families. If the bore and/or stroke modifications change the displacement of the engine, however, the selection of additional test vehicles would be required by Section 86.421-78 which specifies the selection of a vehicle to represent each engine family-engine displacement-emission control system combination if the pro-

jected annual sales for the family are 5,000 or more vehicles.

If you have any questions regarding this letter, please contact me at (313)668-4244 or Mr. T. Snyder at (313)668-4442.

Sincerely yours,

John W. Bozek  
Certification Branch  
Certification Division  
Office of Mobile Sources

Kawasaki Motors Corp. U.S.A.

2009 East Edinger Avenue, P.O. Box 11447, Santa Ana, California 92711  
(714) 835-7000

November 30, 1983  
84EC-37

Director Certification Division  
Mobile Source Air Pollution Control  
U.S. Environmental Protection Agency  
2565 Plymouth Road  
Ann Arbor, MI 48105

Attn: Motorcycle Certification Team

Dear Sir:

We are requesting EPA to confirm that our interpretation of the term "Bore Spacings" is correct. This term is currently indicated in 40 CFR 86.420-78(b) as part of the criteria a manufacturer will use to determine the acceptability of grouping reciprocating engines into engine families.

When comparing the Light Duty Vehicle Regulation 86.082-24 con-

cerning test vehicles and engines, with the Motorcycle Regulation concerning engine family selection, two different terms are used that we feel are synonymous to each other. Light Duty Vehicle Regulations state "Bore Line Center-to-Center" as part of-the criteria while Motorcycle Regulations use the term "Bore Spacings".

We feel both terms (Bore Line Center-to-Center and Bore Spacings) express a similar meaning. That is, Bore Spacings on inline engines are determined by measuring the distance in millimeters between the bore center line of each cylinder in the cylinder block. On V-Twin engines the bore spacings would be determined by the amount of separation, in degrees, between each cylinders bore center line.

Two dimensions concerning bore spacings would be considered when determining engine families utilizing Vee type engine configurations with multiple cylinders. (i.e. V-Four, V-Six etc.) One dimension is the bore spacings between the center line of each cylinder bore in the same block. The other would be the amount of separation, in degrees, between the bore center line of each cylinder block.

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Your early response concerning this request will be greatly appreciated. We are now in the process of determining engine families for the 1985 model year. A correct interpretation of what the term "Bore Spacings" means and how it will be used to determine the acceptability to group reciprocating engines into engine families is critical.

Thank you.

Sincerely,

Jeffrey D. Shetler  
Government Relations Coordinator

JDS/bb